Decentralized Roadside Equipment

    TC

        MSNEO

            CSM

5.2.1.001	Signals shall be capable of operating in automatic signal timing mode.	Derived
5.2.1.002	Signals shall be capable of operating in manual override mode.	GGO 6.5.2, USR 1.6.3.5
5.2.1.003	Signals shall be capable of operating in pre-emption or priority mode.	Derived
5.2.1.004	Signals shall be capable of operating in manual override using using secured wire and wireless communications	MnA 976
5.2.1.005	Signal pre-emption shall be available on-demand for emergency vehicles at traffic signal intersections to minimize delays in responding to emergencies and reduce safety hazards when passing through intersections by providing preference over others.	GGO 6.5.3, MnA 973,9
5.2. 1.006	Signal priority shall be available on-demand for transit vehicles and other authorized vehicles at traffic signal intersections along transit routes to facilitate adherence to transit schedules by providing preference over others.	GGO 6.5.3, USR 1.6.1.2.
5.2.1.007	Signal pre-emption and signal priority timing shall be determined automatically when signal pre-emption requests and/or signal priority requests are received from authorized emergency, transit, or railroad vehicles.	UST 5.2.3.2
5.2.1.008	Signal pre-emption shall be available on-demand for railroad trains at traffic signal intersections to minimize safety hazards when passing through grade level crossings by providing highest priority to the railroad.	Derived

            ISTP

5.2.2.001	Real-time, adaptive control of signaling devices shall be provided throughout the traffic control system network to allow traffic flow optimization via rapid modification of signal controls on arterials.	GGO 6.10.1, USR 1.6.3.
5.2.2.002	Real-time, adaptive control of signaling devices shall be provided throughout the traffic control system network to allow traffic flow optimization via rapid modification of signal controls on highways.	GGO 6.10.1, USR 1.6.3.

5.2.2.003	Real-time, adaptive control of signaling devices shall be provided throughout the traffic control system network to allow traffic flow optimization via rapid modification of signal controls integrated with freeways.	GGO 6.10.1, USR 1.6.3.
5.2.2.004	Signal timing plans shall be integrated, coordinated and consistent across wide areas including multiple jurisdictions to avoid issuing conflicting controls and to minimize traffic delays.	USR 1.6.3.2, 1.6.3.2.1
5.2.2.005	Signal timing plans shall be maintained and modifiable on-demand in real-time.	USR 5.2.3.1
5.2.2.007	Signaling systems shall be programmable and fully adaptive.	GGO 6.5.1, MnA 968
5.2.2.008	Signal timing plans and signal controls shall be selectable/modifiable by traffic control operators in real-time to respond to changing traffic requirements and modify system response.	USR 1.6.3.1, 1.6.3.3.1, 1
5.2.2.010	Signal timing plans and signal controls shall be selectable/modifiable in a coordinated manner across multiple jurisdictions to reduce traffic flow impact of an incident report.	USR 1.6.3.6, 1.7.2.5
5.2.2.011	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to trafic volume/occupancy data feedback.	USR 1.6.3.3.2, 1.6.1.6
5.2.2.012	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to current traffic conditions feedback.	USR 1.6.3.3.2, MnA 914
5.2.2.013	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to incident reports.	USR 1.6.3.3.2, MnA ?
5.2.2.014	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to current and predicted/forecast travel conditions.	USR 1.6.3.3.2, MnA ?
5.2.2.015	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to reversible lane change requirements.	USR 1.6.3.3.2, 1.6.3.3.4
5.2.2.016	Signal timing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to turn restriction change requirements.	USR 1.6.3.3.2, 1.6.3.3.4
5.2.2.017	Signal controls for currently selected signal timing plans shall be transmitted to the respective traffic signal devices throughout the signal network including traffic signals and intersection controllers.	USR 1.6.1.1.1, 1.6.3.4

Component					Source
Service	**Function**	**Sub-Function**	**Requirement**		
		5.2.2.019	Signal controls for currently selected signal timing plans shall be transmitted to the respective traffic signal devices throughout the signal network including HOV lane signals.		USR 1.6.3.4
		5.2.2.020	Signal controls for currently selected signal timing plans shall be transmitted to the respective traffic signal devices throughout the signal network including human operator.		USR 1.6.3.4
		5.2.2.021	Signal controls shall be updated via on-demand real-time communications along arterials.		MnA 915
		5.2.2.023	Signal controls shall be updated via on-demand real-time communications between arterials and freeways.		MnA 947
	MSR				
		5.2.3.001	Signal resources throughout the network shall be maintained by the respective owner agencies.		Derived
		5.2.3.002	Signal resources throughout the network shall be operated by the mutually agreed upon agencies.		Derived
		5.2.3.003	Individual signal resource operation shall be capable of being passed to a different agency in accordance with documented operating agreements.		Derived
MSNO					
	CSM				
		5.3.1.001	Signs shall be capable of operating in automatic messaging mode.		Derived
		5.3.1.002	Signs shall be capable of operating in manual messaging mode.		Derived
		5.3.1.003	Sign controls shall be determined by the selected signing plans when in the automatic messaging mode.		Derived
		5.3.1.004	Sign controls shall be operator controlled when in the manual messaging mode.		Derived
	ISCP				
		5.3.2.001	Real-time, adaptive control of signing devices shall be provided throughout the traffic control system network to allow flow optimization via rapid modification of sign controls on arterials.		GGO 6.10.1, USR 1.6.3.
		5.3.2.002	Real-time, adaptive control of signing devices shall be provided throughout the traffic control system network to allow flow optimization via rapid modification of sign controls on highways.		GGO 6.10.1, USR 1.6.3.

5.3.2.003	Real-time, adaptive control of signing devices shall be provided throughout the traffic control system network to allow flow optimization via rapid modification of sign controls integrated with freeways.	GGO 6.10.1, USR 1.6.3.
5.3.2.004	Signing plans shall be integrated, coordinated and consistent across wide areas including multiple jurisdictions to avoid issuing conflicting messages and to minimize traffic delays.	USR 1.6.3.2, 1.6.3.2.1
5.3.2.005	Signing plans shall be maintained and modifiable on-demand in real-time.	USR 5.2.3.1
5.3.2.006	Sign controls shall be maintained and modifiable on-demand in real-time.	MnA 993
5.3.2.007	Signing systems shall be programmable.	GGO 6.5.1, MnA 968
5.3.2.008	Signing plans and sign controls shall be selectable/modifiable by traffic control operators in real-time to respond to changing traffic requirements and to modify system response.	USR 1.6.3.1, 1.6.3.3.1, 1
5.3.2.009	Signing plans and sign controls shall be selectable/modifiable via a single agency across multiple jurisdictions.	MnA 972
5.3.2.010	Signing plans and sign controls shall be selectable/modifiable in a coordinated manner across multiple jurisdictions to reduce traffic flow impact of an incident report.	USR 1.6.3.6, 1.7.2.5
5.3.2.011	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to traffic volume/occupancy data feedback.	USR 1.6.3.3.2, 1.6.1.6
5.3.2.012	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to current traffic conditions feedback.	USR 1.6.3.3.2, MnA 9 14
5.3.2.013	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to incident reports.	USR 1.6.3.3.2, MnA ?
5.3.2.014	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to current and predicted/forecast travel conditions.	USR 1.6.3.3.2, MnA ?
5.3.2.015	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to reversible lane change requirements.	USR 1.6.3.3.2, 1.6.3.3.4
5.3.2.016	Signing plans shall be dynamically adaptable in real-time based on traffic situations including but not limited to turn restriction change requirements.	USR 1.6.3.3.2, I.6.3.3.4

5.3.2.017	Sign controls for currently selected signing plans shall be transmitted to the respective signing devices throughout the signal network including changeable message signs (fixed).	Derived
5.3.2.018	Sign controls for currently selected signing plans shall be transmitted to the respective signing devices throughout the signal network including fixed-location variable message signs.	Derived
5.3.2.019	Sign controls for currently selected signing plans shall be transmitted to the respective signing devices throughout the signal network including portable variable message signs.	Derived
5.3.2.020	Sign control shall be updated via on-demand real-time communications along arterials.	MnA 915
5.3.2.021	Sign control shall be updated via on-demand real-time communications along freeways.	MnA 985
5.3.2.022	Sign control shall be updated via on-demand real-time communications between arterials and freeways.	MnA 947

MSR

5.3.3.001	Sign resources throughout the network shall be maintained by the respective owner agencies.	Derived
5.3.3.002	Sign resources throughout the network shall be operated by the mutually agreed upon agencies.	Derived
5.3.3.003	Individual sign resource operation shall be capable of being passed to a different agency in accordance with documents operating agreements.	Derived

MTC

CTD

5.4.1.001	Traffic surveillance data, needed for determining current traffic conditions and predicting future conditions, shall be collected and maintained.	USR 1.6.2.2
5.4.1.002	Traffic surveillance data shall be collected throughout large geographic areas.	USR 1.6.2.3
5.4.1.003	Traffic surveillance data shall be collected multiple jurisdictions.	USR 1.6.2.3
5.4.1.004	Traffic surveillance data shall be collected for a large number of roadway segments.	USR 1.6.2.3.2
5.4.1.005	Traffic surveillance data shall be collected at specific locations as needed.	USR 1.6.2.4
5.4.1.006	Trafftc surveillance data shall be collected in real-time.	USR 1.6.2.1

Component				Source
Service	**Function**	**Sub-Function**	**Requirement**	

		DITC		
		5.4.3.008	Traffic surveillance data feedback shall be provided to signal network operations and sign network operations agencies to facilitate real-time, adaptive signaling and signing control.	USR 1.6.2.2.1
		5.4.3.009	Traffic conditions information feedback shall be provided to the signal network operations and sign network operations agencies to facilitate real-time, adaptive signaling and signing control.	USR 1.6.2.2.1
		DTC		
		5.4.2.001	Traffic surveillance data shall be processed to determine link-specific traffic speeds.	MnA 920,92 1
		5.4.2.002	Traffic surveillance data shall be processed to determine link-specific as traffic flow parameters.	USR 1.6.2.3.1
		5.4.2.003	Traffic surveillance data shall be processed to determine link-specific congestion levels.	MnA 962
		5.4.2.004	Traffic surveillance data shall be processed to determine link-specific vehicle presence.	USR 1.6.2.1
		5.4.2.005	Traffic surveillance data shall be processed to determine identifiy HOV vehicles.	USR 1.6.2.1.1
		5.4.2.006	Traffic surveillance data shall be processed to determine identify presence of pedestrians in crosswalks.	GGO 29.5.1
		5.4.2.007	Traffic speeds shall be accurate to (+/- TBD).	Derived
		5.4.2.008	Traffic flow shall be accurate to (+/- TBD).	Derived
		5.4.2.009	Link-specific traffic conditions information shall be determined for geographically referenced roadway segments.	Derived
	PTCS			
		MTCP		
		5.1.2.001	Traffic control plans shall be developed based on traffic control requirements and strategies that consider traffic volume occupancy data analysis.	Derived
		5.1.2.002	Traffic control plans shall be developed based on traffic control requirements and strategies that consider traffic conditions data.	Derived
		5.1.2.003	Traffic control plans shall be developed based on traffic control requirements and strategies that consider safety statistics (accident statistics by location, etc.).	Derived

5.1.2.006	Traffic control plans shall facilitate traffic movement in a manner that minimizes traffic delay times.	USR 1.6.1.1.3
5.1.2.007	Traffic control plans shall facilitate traffic movement in a manner that minimizes energy use.	USR 1.6.1.1.4
5.1.2.008	Traffic control plans shall facilitate traffic movement in a manner that maximizes traffic-movementefficiency.	USR 1.6.1.1
5.1.2.009	Traffic control plans shall facilitate traffic movement in a manner that minimizes air quality impacts.	USR 1.6.1.1.5
5.1.2.010	Traffic control plans shall facilitate traffic movement in a manner that incorporates current traffic demand.	USR 1.6.1.4
5.1.2.011	Traffic control plans shall facilitate traffic movement in a manner that incorporates expected traffic demand.	USR 1.6.1.4
5.1.2.012	Traffic control plans shall facilitate traffic movement in a manner that predicts travel patterns.	USR 1.6.1.5
5.1.2.013	Traffic control plans shall include provisions for dissipating traffic congestion.	USR 1.6.1.4.1
5.1.2.014	Traffic control plans shall include provisions for moving traffic around incidents.	MnA 988
5.1.2.015	Traffic control plans shall include provisions for handling predictable fluctuations in traffic patterns/volume (e.g.; workday rush hours, weekends, holidays, etc.).	Derived
5.1.2.015.a	Traffic control plans shall include provisions for moving traffic in inclement weather.	Derived
5.1.2.018	Traffic control plans shall be based on integrated traffic control strategies and traffic volume/occupancy data that are coordinated across multiple agencies/jurisdictional boundaries.	MnA 919,912
5.1.2.019	Traffic control plans shall be based on integrated traffic control strategies and traffic volume/occupancy data that are coordinated along arterial/freeway corridors.	MnA 919,964
5. B2.020	Traffic control plans shall be based on integrated traffic control strategies and traffic volume/occupancy data that are coordinated for streets and highways.	MnA 919, USR 1.6.0
5.1.2.021	Traffic volume/occupancy data shall be collected, stored and maintained to support traffic management performance analysis.	MnA 913,916

Component				Source
Service	**Function**	**Sub-Function**	**Requirement**	
		5.1.2.022	Traffic volume/occupancy data shall be collected, stored and maintained to support growth planning analysis.	MnA 916
		5.1.2.023	Traffic volume/occupancy data shall be collected, stored and maintained to support problem intersection analysis.	MnA 918,983
		5.1.2.024	Traffic volume/occupancy data collection and analysis shall be coordinated across multiple agencies and jurisdictions.	MnA 923
		5.1.2.025	Traffk control plans shall be updated based on traffic control requirements changes and improvements identified from traffic volume/occupancy data analyses.	MnA 977
		5.1.2.026	Traffic control plans shall be selectable to suit the current or predicted traffic situations.	Derived
		5.1.2.027	The active traffic control plan shall include coordinated signal timing plans and signing plans that implement the traffic control strategy appropriate for the current or predicted traffic situation.	Derived
TCI				
	MTCD			
		STD		
		1.1.1.006	Traffk surveillance data shall be sensed.	MnE 1.3
	MTCI			
		DTCI		
		1.2.1.012.b	Travel conditions shall be made available to humans	Derived
		1.2.1.023	Travel conditions shall be distributed via variable message signs.	MnE 1.3.3,2.4.3, GGO
TFM				
	MFO			
		MSA		
		7.2.4.008	A signal priority request shall be generated when a transit vehicle is running late by more the (tbd) minutes.	USR 2.1.1.2.3, MnA 5.3.
		7.2.4.008.b	A signal priority request shall be generated when a transit vehicle is running late.	George Serumgard corn

Component				Source
Service	**Function**	**Sub-Function**	**Requirement**	
		7.2.4.009	A signal priority request shall enable a transit vehicle to pre-empt both intersection traffic signals and ramp meter signals.	MnA 5.3.2
		7.2.4.010	Fleet vehicles shall arrive/depart within (TBD) minutes of the published schedule.	USR 2.1.1.2.1